# the Mechelecty

VOL. 29 DECEMBER 1949 NO. 3


THE SCHOOL OF ENGINEERING
THE GEORGE WASHINGTON UNIVERSITY

## THE MECHELECIV

Published at the George Washington University by direction of the Engineers' Council. Published six times during the school year in October, November, December, March, April, and May.
Subscription price: One Dollar

### *Editorial Staff*

CHUCK FLYER — *Editor*
BUDDY DIMMETTE — *Associate Editor*
LENNY GRANT — GEORGE TAYLOR
DICK DANIELS — E. W. HAYES
GEORGE TITHINGTON — L. B. PROCTOR, JR.

### *Business Staff*

BILL SEABROOKE — *Business Manager*
EDWARD EGLOFF — R. BESIER
JOHN CONNER — CLINT WARD
DAVID BRITTLE — GERALD SUMMERS

*Chairman, Alumni Advisory Board*
MR. WATSON DAVIS

*Faculty Advisor*
PROFESSOR NORMAN B. AMES


## • A CAMPUS TRADITION?

Sigma Tau fraternity, together with the Engineer's Council, has been working for some time with Dr. Johnson, of the Engineering School, in an effort to develop a satisfactory plan for the use of the ship's bell of the old ship "George Washington" as a campus tradition. We are not fully familiar with their plans, but it would seem that the bell could be used in the 'ivy-covered' tradition very nicely here on the University campus, and we have a suggestion for such use.

We suggest that a pool about twenty feet in diameter and perhaps two feet deep be dug in the campus directly behind Lisner Terrace, roughly opposite the back entrance to Corcoran Hall. The pool, lined with concrete, could be surrounded with a strip of flagstone approximately one foot wide, level with the surrounding turf. In the center should be a small island, say three feet in diameter, rising to the level of the flagstone. On this island could be two supports about eight feet high, surmounted by a 'pagoda-type' roof, under which the bell would be hung. Pipes would have to be laid to this pool from the nearest building to provide for a frequent change of water to avoid stagnation. Perhaps water lilies and even gold fish could be placed in this pond.

Midshipmen at Annapolis are said to pray to Tecumseh for assistance in their examinations, and they pitch pennies at the foot of the bronze statue just before the Army-Navy football game to buy his assistance in scoring. Well, Tecumseh is a bronze casting of the figurehead of the old ship "Delaware." It is mounted on a simple square monolith about five feet high. Certainly our idea on the ship's bell would place it in a comparable position as a historical object of veneration. Also we could pitch pennies in the pool at the base of our bell, just as the midshipmen do at Annapolis. Maybe our past record in the traditional GW-Georgetown game is because we haven't got anywhere to throw pennies. Certainly a good many examination grades around school could stand improving, and if it takes a ship's bell to do the improving, the bell should be installed without further ado.

In this matter, as in many others, the general student body stands back and lets a few students do all of the work. It certainly couldn't hurt if a few students, and alumni, commented on the matter. To make this easier, we suggest that anyone interested write to Mecheleciv, Student Union Annex, with a direct vote for or against the idea we have outlined above. Just put a slip of paper with your comment on it in an envelope and drop it off or mail it to us. We will take a count on your opinions and give it to Sigma Tau and the Council, for their information.

**ENGINEERS' BALL**

Friday, February 17, 1950

All engineering students and alumni are invited to attend. Get your ticket from any member of the Engineers' Council.

## TABLE OF CONTENTS



***About Our Cover . . .***

*Nordenssen gas burners installed in one of two 125 h.p. Farrar & Trefts low-pressure steam boilers, which heat the 1,865,000 cubic-foot Washington Gas Light Company office building. The total installation is rated at 8,000,000 b.t.u. per hour, and, in addition to heating the building in the winter, also supplies steam to a Williams Oil-o-matic absorption air conditioning system in the summer. It is the second largest gas-burning installation in Washington.*



## *from the editor's mailbox*

*This space is intended to serve as a forum for student opinion. Opinions expressed are those of the writers, and not necessarily those of the* MECHELECIV. *Address communications to: Editor's Mailbox, the Mecheleciv, Student Union Annex, George Washington University.*

THE EDITORS.

November 8, 1949

Dear Editor,

I have just finished looking over the November issue of your little magazine. There are a few suggestions which I would like to make in the hopes that you can improve it next time.

Perhaps the most obvious examples of ineptitude in the magazine are the carry-overs of the longer articles. Maybe you were trying to confuse the reader by omitting identification lines at the top of the carried-over column, and by carrying over several articles to the same page. If this was your intention, you have succeeded admirably.

Another example of the poor editing was the editorial page, on which there were three glaring proof-reading errors. I didn't get my copy until November 6, and I was patiently waiting, saying to myself that you needed the extra time to do a good job on the magazine, until I note that the thing was thrown together with about six different kinds and sizes of type on the same page, and apparently had not been proof-read.

I am enclosing a copy of the Chicago Manual of Style and a little publication of my own on writing for technical journals in the hope that they will help improve the Mecheleciv.

Sincerely,
Diogenes.

● *Ouch!—Ed.*

Dear Editor,

Homework is definitely a necessary evil for engineering students. They have to be able to solve problems if they are going into an engineering career. For this reason I do not advocate abolishing homework, but I do think that a little less in most courses would not hurt. In fact, in some subjects I lose sight of the basic fundamentals while struggling through involved mathematical computations. I have become an expert slip stick artist while doing four or five problems of basically the same principle. However, I do not think that this is what my future employer will be looking for. He will be looking for a well rounded out individual who has participated in other school activities outside of studying, and who knows the underlying principles of engineering. He will want a person who can use his mind to think out a solution, not just a mechanical problem worker. There are many professors that realize that too many problems will sour the class and they are to be commended, but there are some professors who pour it on making it difficult for students to join their societies or other school activities. I am only asking that they give the students a break by eliminating unnecessary homework, yet by teaching theory make us thinking engineers.

Active Student.

● *Could be—Ed.*

# The Dupont Circle Underpass

***By R. G. Daniels***

The Dupont Circle underpass project is one of a series of efforts to alleviate the congestion of Washington streets. The most recent Census Bureau figures place the Washington area population figure at about 1.4 million people, indicating a growth of 45% since 1940. This tremendous expansion has placed a heavy load on all the traffic facilities of the city and has necessitated a large number of construction projects, such as the recently completed Whitehurst Freeway, the Potomac River Bridge, and the Anacostia River Bridge, to relieve the strain.

Dupont Circle, situated at the intersection of Connecticut and Massachusetts Avenues, was a point of heavy congestion during the rush hours. The situation was further complicated by the fact that both the north and south bound streetcars used the same side of the circle. The Washington driver was always irritated to meet a streetcar head-on in heavy traffic, but the out-of-town driver was completely confused by the occurrence.

The solution arrived at by the District of Columbia authorities was to pass Connecticut Avenue and the streetcar tracks under Dupont Circle in a vehicular underpass. The District Engineers therefore were confronted with an extensive project with many engineering problems to be solved.

Before any construction was begun, borings were taken at all points along the proposed routes of the various excavations. These borings were made with two purposes in mind. The first was to determine what type of foundation would be necessary to support the structures, and second, to estimate the volume of rock that would have to be removed. Unlike a great many Washington areas, no water was encountered when excavation was begun. The one unstable element discovered was a stratum of gumbo. This is a blue clay of rather sodden nature. If a heavy piece of equipment, such as a crane, were left standing on such ground overnight without matting, it would sink several feet. As a result, the gumbo had to be removed until a more stable stratum was reached.

On the excavation for the vehicular tunnel, rock was encountered. Some 800 cubic yards of rock were removed and the tunnel foundations placed on rock. In other sections, varying strata were encountered, where a layer of rotten rock might lie over a more stable layer, which in turn covered a stratum with poor load bearing characteristics. As a result, the District's Materials Testing Laboratory was required to take borings as work progressed, and check the load bearing characteristics. One sample, judged by an engineer with considerable experience to be of inferior characteristics, was taken to the Bureau of Standards for test. The boring fell apart in the car on the way out to the Bureau, but when examined by Bureau experts, was adjudged capable of sustaining 5 and 6 ton loads when confined. This indicates that eye inspection, even by experienced personnel, can be misleading. Strata underlying this particular sample were capable of sustaining loads of 21, 28, and 40 tons respectively, as the depth increased, thereby assuring a stable foundation.

The initial step in the construction was to move the public utilities, sewers, water mains, and underground cables from the center of the street. They were to be placed under the sidewalks all the way around the circle, to clear the way for the central excavation. It was also necessary to dismantle the large stone fountain honoring Rear Admiral Samuel Dupont, and to store it in sections in other parts of the circle. In addition, several of the 36 huge elm trees were removed, amid mourning by the local newspapers. The remaining trees were protected from damage by heavy tree boxes.

Before any excavation was made, the problem of protecting the footings of the buildings along the way of the various tunnels had to be solved. Calculations were based on the earth pressure expected at the foundation of the Dupont Circle building, the highest structure in the area. The sheathing chosen,

*Early stages of construction of vehicular tunnel.*

*Structural steel in place at southern end of southbound transit tube.*

DB-2, was the second most rigid manufactured by Bethlehem Steel, and provided a satisfactory factor of safety. The sheathing was driven to a depth of thirty feet, and remained in place until the completion of the transit tubes. It was withdrawn after the backfill was completed between the tubes and the store fronts.

The vehicular tunnel passes completely under the 480 foot circle and the encircling roadways, being 579 feet from portal to portal. It follows the line of Connecticut Avenue and is divided into two roadways, each twenty-two feet from curb to curb, with a four foot median strip separation. The transit tubes, which begin at S Street on the north and end at N Street on the south, diverge soon after the tracks are underground. The walls of the depressed approaches to the vehicular tunnel are the inner walls of the transit tubes. These walls will be faced with rough finish granite blocks. The western side of the north approach is being faced at the time of this writing and the stone masons' methods may be observed. To prevent the heavy blocks from forcing the mortar from between the blocks as they are set in place, granite chips are used as wedges until the mortar sets. The chips are then knocked free and the gaps filled.

The transit tunnel is of steel reinforced construction, but no structural steel is used in the rigid frame itself. The network of reinforcing steel is quite complex. Five-eighths inch steel rods are used throughout for both lateral and transverse secondary reinforcing, with heavier rods for some lateral and vertical reinforcing. The concrete, supplied by the P. Y. K. Howat Company, is specified as 3000 pounds per square inch. A representative of the District Engineers Materials Testing Laboratory is on duty at all times to ascertain that the mix meets the specifications. All cement for any one pour must be supplied by the same manufacturer. Different cement manufacturers' products may be used for different pours as long as the test stipulation is met. One other factor which must be controlled is the color of the concrete. This is for purely aesthetic reasons, so that those sections of the underpass which are not faced will not show too great a contrast. The Materials Testing Laboratory has kept a constant check on the performance of the concrete by running tests on more than 600 test cylinders. The average pour has reached 2600 pounds test in seven days and 4000 pounds in twenty-eight days, thereby surpassing the minimum standards by 1000 pounds.

The problem of maintaining uninterrupted streetcar service complicated construction somewhat. Temporary tracks were placed close to the sidewalk while the vehicular tunnel excavation was being made. After this tunnel was completed, earth fill was placed on top of it and car tracks were set in cement slabs over the fill. With the car tracks running over the center of the circle, excavation for the transit tubes was begun. The course of the tunnels follows the perimeter of the circle under the eastern and western roadways. There is a sub-surface stop on each side of the circle with a total of nine stairway entrances, so that pedestrians may choose their desired street without risking themselves in surface traffic. The subway station walls are lined with standard subway ceramic tile, while the walls of the entrance stairways are faced with smooth granite slabs.

Whereas the vehicular tunnel will be subjected primarily to the dead load of the fountain, when it is replaced in the center of the circle, the transit tubes will bear a moving load of the surface traffic around the circle. The rigid frame of the transit tubes is therefore of structural steel. The columns are 10 inch, wide flange, 49 pounds-per-foot beams, while the overhead cross beams are 24WF76. Each frame is secured to the footings, which are steel-reinforced concrete. Earth fill is the only factor used to prevent motion of the footings. These structural steel frames are spaced at five-foot intervals. In addition to the rigid frame of structural steel, the entire frame is immersed in a heavily reinforced concrete, similar to that of the vehicular tunnel. This is keyed into the reinforced concrete footings to form an integral structure. The theoretical design was based on a 45 ton special trailer load. The working stress for steel was taken as 1600 pounds per square inch, so that a safety factor of four was introduced. The whole wall was then overdesigned, so that the safety factor runs up to ten or twelve. The tube system is covered with a three ply waterproof membrane, covered with structural tile and topped by a 2.5 inch concrete slab.

One of the main questions to be answered in the early design stages was the control of surface water, since a summer storm could flood the entire underpass in a few minutes unless provisions were made for

(*Continued on page fifteen*)

# The Vital Role of the Civil Engineer in America's Future

***By Rear Admiral J. J. Manning, CEC, U. S. Navy***

***Chief of Civil Engineers, U. S. Navy***

*A speech made November 1, 1949 before the Fall Meeting of Student Chapters of the American Society of Civil Engineers, at the Interior Department auditorium in Washington.*

Some day, perhaps twenty years from now, you will be able to appreciate my feelings at this moment. On that distant day, you may be called upon to address a group of young engineers, and you will feel their eyes upon you—critical eyes—which seem to say: "This chap is supposed to be an expert. He's supposed to know all the answers." And when that time comes, you will know very well that you are *not* an expert, and you will be quite sure that your years of experience have given you very few answers—and even these will be buttressed with qualifications. You will realize as I do now that young engineers have a disconcerting knowledge of many things that older engineers have forgotten.

However, there are compensations for growing older in the engineering business. As the hard, bright facts of formal education begin to dull with time, we begin to develop a better understanding of human relationships and the ways and means of translating knowledge and ability into effective action. We learn that many phases of engineering have more to do with psychology than mathematics, and that quite often a slide rule can be of far less value than a sense of humor.

But I did not come here to philosophize. Instead, I came to discuss with you the vital role of civil engineers in America's future. What's more, I intend to skip the platitudes and to brush once over lightly those fundamentals about which we already are agreed. I am sure you are aware that the basic functions of the Civil Engineer are: first, to create and improve the physical structures which support our standard of life; and second, to mobilize his special knowledge in defense of the country against outside aggression. I'm sure I don't need to deliver an oration in support of either function. This dual role is conceded.

There are, however, other obligations of a civil engineer which are less commonly recognized—and which must be met if his vital role is to be played out to the full. He must develop several qualities which, in my humble opinion, are too often minimized.

I would say that of all the qualities of a civil engineer which are generally lacking, the principle one is the engineer's inability to present his case effectively to non-engineers. Now let me explain:

I wonder if you recall that old English folktale about the country man who went to a village fair. He saw a large crowd gathered about an entertainer who was imitating the squeal of a little pig. He went over and joined the crowd, which was getting quite a kick out of the performance. But the country man thought the imitation was a very poor one. So the next day he returned and demanded that the crowd listen to his own version of a young pig squealing. The crowd listened for a minute and told him that his imitation was no good. Whereupon, the country man reached inside his coat and pulled out a little pig that he had been pinching. The crowd was still unimpressed. They still preferred the professional pig squealer—in other words, it is one thing to have a good product, and it is another thing to convince laymen that your product is the one they want.

Therein, I believe, lies one of the big problems of civil engineers. Only one in a thousand has developed the ability to persuade large numbers of laymen of the validity of his ideas. It seems that by nature we are so much in love with facts that we neglect to develop those skills necessary to persuade others to our convictions.

The result is a common feeling of frustration among engineers, arising from the fact that too often they come off second best in their encounters with salesmen and politicians. In fact, one statement has become almost an adage: He is a great engineer, but he is a lousy politician. I know all of you have heard this evaluation made of many of the leaders in our profession.

A politician and an engineer who had been discussing some project of mutual interest left the office of the engineer and together they went to the Club for luncheon. As they entered the Club a gentleman was just leaving whom the politician greeted and shook hands with him. The engineer remained silent. As the politician rejoined the engineer and they entered the Club, the politician said to the engineer: 'Don't you know Mr. So-and-So?' The Engineer said, 'Yes, I know him.' The politician said 'I didn't see you speak to him.' The engineer said 'He knows that I know him so why should I speak to him.'

I suspect you may have accepted this characterization of engineers with a certain amount of defensive pride. You have interpreted it as an indication of integrity on the part of the engineer, and probably you were entirely correct. Nevertheless, to accept with equanimity the fact that our profession need not

develop the talents to persuade non-engineers to our point of view is a sad shortcoming. Instead of criticizing the popular approach, we had better pause and examine how we might better improve our own.

Now, I know that the American people have taken as inalienable the right to denounce politicians, and I think that the loudest in the denunciation are scientific men. This is natural enough, because the training of engineers and politicians is poles apart. We engineers prefer to deal with tangible facts which lend themselves to exact measurement and analysis. We want to know *exactly* what conclusions can be drawn from a given set of conditions. We do not tolerate vagaries, and we are contemptuous of emotionalism. We are confounded when we discover that the popular mind cannot appreciate the careful logic of our viewpoint. The politician, on the other hand, is highly skilled in dealing with intangibles. He is able to appraise with amazing accuracy emotions and prejudices, and to harness those great human forces which lie beyond the capacity of any mathematical formula to measure and evaluate.

Far from being contemptuous of such powers as we engineers do *not* possess, we should seek to develop them for ourselves.

Now, the question is how can we do this? I can't give you all of the answers, but I *can* give you some suggestions. The first of these is basic to the others. It is to avoid professional snobbery.

Many times you will encounter intelligent men whose vocabularies are, to put it mildly, devoid of the simplest engineering terms. To you who are trained to think in these and other scientific terms, it will seem that a non-engineer's mind must indeed be filled with cobwebs. You are likely, therefore, to underestimate his intelligence. Now, the fact may well be that he is a pretty sharp character and that you would do well to listen to him not simply with indulgence but with respect. I know that you will find it hard to do this, and many times you will find that you were correct in your first judgment. Nevertheless, an engineer who possesses humility rather than arrogance in dealing with non-engineers is going to profit in the long run—and, for that matter, in the short run too. You have everything to gain from listening with an open mind to non-engineers, rather than underestimating them because of their ignorance of scientific terminology.

In short, guard against any tendency to professional snobbery. I assure you that the farther you get from your theoretical training, the more value you will attach to those human relationships which are based upon open-mindedness and mutual respect.

Another point I would like to make concerns a tendency of young engineers to seek economic security at almost any sacrifice. Not so long ago, we made a survey of senior engineering students in college to determine what they considered the most important inducement in accepting a job. The majority wanted job security. Almost as many were interested primarily in salary, and close to the bottom on the survey were those few who wanted only the *opportunity* to develop professionally.

I can sympathize with a young man's desire for security, but it should not be sought for its own sake. Instead, it should come as the incidental result of ambition, enthusiasm and hard work.

The other day I was impressed by a precept which Ralph Waldo Emerson gave to a student audience some seventy years ago. "When," he said, "you are willing to renounce your ideals and ambitions for premature comforts and security, then dies the man in you, then once more perish the buds of art and poetry and science as they have died already in a thousand men. Explore and explore. Be neither chided nor flattered out of your position of perpetual inquiry. . . . Why should you renounce your right to traverse the starlit deserts of truth . . . for premature comforts?"

In other words, don't dull the fine edge of your skill and training by concentrating too hard on immediate security. If you are worth your salt that will come of itself as the result of hard and original work.

Another suggestion I would like to offer concerns the importance of being able to speak and to write effectively. In regard to the former, please don't look upon me as an example of effective speaking. Instead, you will have to consider what I say, rather than the way I say it. You may recall the story of the old stumble-bum who volunteered to make a speech for the Salvation Army. He managed to climb up on a soap box and stood there weaving from side to side. Then he shouted this sentence: "Whiskey is no damn good. Don't ever touch it. Now do as I say and not as I do!"

Times without number I have squirmed in my seat because I had to suffer the agony of hearing my fellow engineers fall on their forensic faces. I have listened to sound arguments presented so poorly that even I could not blame the audience for not accepting them.

In fact, I was so much impressed with this shortcoming on the part of my co-workers that last year I authorized groups of them to attend weekly classes in public speaking. You'd think that I had ordered them to a series of classes at Buchenwald. Men whose personal courage had never before been in doubt and whose coats were covered with campaign ribbons and battle stars had the look of boot sailors under fire for the first time. The instructor advised me that they certainly must be good engineers because, with a cou-

(*Continued on page eighteen*)

# A Union For Engineers?

**Compiled by C. C. Dimmette**

*From correspondence with Mr. E. L. Chandler of the American Society of Civil Engineers and other sources.*

*Here is one viewpoint on a controversial subject of interest to almost all graduating engineers. Comments or rebuttals are invited.*

It is doubtless true that many professional engineering employees never will have the slightest interest in collective bargaining, even under the Taft-Hartley Act. The young man who enters the modest-size organization or a consulting engineering office probably will never give it a thought. However, the large industrial and manufacturing establishments where hundreds of engineers employed in one company have little opportunity to maintain personal relations with the management appears to have its place for group action by professionals. Here the professional employee is not likely to be able to deal with management directly, and experience has indicated that there are many advantages to both management and employees alike in a program which provides for full discussion between management and representatives chosen by the employees regarding problems of common interest.

In agreement with this argument Mr. E. L. Chandler, Assistant Secretary of the American Society of Civil Engineers, in answer to a request from the editors of the Mechelecіv to present an article on the point of view that a union has no place in a profession, replied: "While I am thoroughly disgusted with much of the maneuvering of labor unions and while I certainly do not think a professional employee ought to be mixed up in the ordinary type of labor union activity, I have come to the conclusion that there is a place for collective bargaining activity by professional employees." Mr. Chandler went on to point out, however, that this type of organization would pertain chiefly to large industrial and manufacturing organizations.

Prior to the passage of the Taft-Hartley act, the Wagner act was the most important of the labor laws, especially to professional engineers. It was the purpose of the Wagner Act to guarantee to employees "the right to self-organization, to form, join, or assist labor organizations to bargain collectively through representatives of their own choosing, and to engage in concerted activities for the purpose of collective bargaining, or for mutual aid and protection."

Under the Wagner Act labor was favored in its relations with management. However, the Act and interpretations and decisions of the National Labor Relations Board still did not favor the engineer. In many cases, professional engineers in order to hold their jobs, were forced to join unions composed almost entirely of nonprofessional employees in the manual trades. Many situations developed in which professional men found their bargaining rights had been claimed by unions with which they did not wish to be affiliated.

One example of this is the case of the Shell Development Company, Inc., at Emery, Calif. In the early 1940's, 201 professional men, largely chemists, among whom were 44 with the degree of Doctor of Philosophy, found themselves about to be forced into a heterogeneous bargaining unit with a slightly larger number of nonprofessional employees. Among the latter were a considerable number of roustabouts, janitors, window washers, and the like. Quite appropriately, the professionals raised violent objection and a long-contested struggle ensued. With financial and legal assistance from the American Chemical Society, the case was fought to a finish before the National Labor Relations Board, with the fortunate result that the professional men succeeded in gaining recognition for an organization of their own and were able to stand by themselves.

Professional engineering employees of the Westinghouse Electric Corporation of Bloomfield, N. J. were also included in a mixed group. Among other things they were forced to go out on strike, and their protests brought reprisals. In this case the National Labor Relations Board refused to grant their request for a separate bargaining unit under the Wagner Act.

Many years later, after the passage of the Taft-Hartley Act they finally succeeded in getting out of their predicament.

When the Taft-Hartley Act was passed in 1947 the engineers at last found themselves able to decide, by a majority vote of their own numbers, whether they wanted to form a unit of their own for collective-bargaining purposes, to join some other bargaining group, or to refrain from any action of the sort, if they so prefer. This is a definite improvement upon the conditions under the Wagner Act where a group of laborers or production workers could force professional engineers to join their union or be dismissed.

If you do find it necessary to join a union after graduation, you will need the principal aspects of

collective bargaining. One of these is the fixing of salaries and the other is the protection and promotion of civil rights. In this latter aspect, collective bargaining becomes a method of building up a system of "industrial jurisprudence."

Wage earners have many specific purposes in seeking to build up a system of industrial jurisprudence. They wish to protect their organizations against being weakened by employers who might discriminate against union members; to strengthen their organization by making union membership an aid to employment; to allocate limited opportunities to work; to make work for themselves; to protect themselves against the cost and impact of technological change.

Unions continually must obtain increasing benefits for their members, else they fail. What labor and the public do not understand, however, is that the steady wage increases that have been utterly impossible had it not been for the efforts of the technologists.

The engineers position is right in the middle between capital and management. It has been mainly through his efforts of increasing the economy of production that unions have been able to demand and get higher wages for its members, yet he has lacked the advantages of membership in a union of his own choosing before the passing of the Taft-Hartley Act. The need for separate unions is illustrated by the case of a young engineer who belongs to a general company union. Most of the members of this union are laborers or office workers, with a minority of professional workers. Of course the laborers, the majority group, make more money than the engineers while the office workers make just as much. In this case a separate union would solve the engineers' problem, making it possible for them to demand, in a proper and dignified way, the salary that their training (four years in college) warrants.

Another aid to engineers in their struggle for a higher economic status is the participation in engineerning societies. A more active interest by the established and respected national engineering societies in the conditions of employment of engineers will help by educating their members in the legal and economic factors of collective bargaining, by providing advice and help where there are acute employment problems, and by giving special consideration to young engineers and members of the subprofessional group.

The American Society of Civil Engineers has followed a very constructive course in this problem. As far back as 1937 the society appointed a committee on unionization whose function was to study the extent of unionization among engineers and recommend to the Board of Direction suitable courses of action. As a result of recommendations by this committee and a study of the legal aspects of collective bargaining, the Board decided to follow a defensive program of providing means for the development of professional units.

In 1943 the Society suggested a new program. Under this plan, preliminary steps of organization might be taken by the local section of the Society. The local section's participation was to become less and less as the bargaining unit was created until the section was entirely divorced from the unit at its completion. It is necessary that the two be entirely separate as the National Labor Relations Board will not recognize a new union that is any way dominated or influenced by the employer. This plan has met with substantial success, as is atested by the fact that a number of professional engineering bargaining groups formed under its terms are currently in existence and functioning satisfactorily.

The Board of Direction also was influential in establishing the policy which was adopted by the Engineers' Joint Council. This policy was presented to Congress and was adopted in principle in the Taft-Hartley Act.

For action under the Taft-Hartley or any other law to be successful, or even tolerable, collective bargaining must be conducted in a straightforward, dignified fashion, compatible with the ideals of professional people. It appears to be true that some of the engineering groups to date have conducted themselves appropriately and in a manner beneficial to both employers and employees. That is as it should be, and if future activity is kept in the hands of good leaders, results can continue to be constructive.

## O.D.K. TAPS THREE ENGINEERS

Omicron Delta Kappa, national leadership honor society for men, tapped six students and one faculty member at the University's homecoming dance October 29. Three of the students tapped were engineering students Leonard Grant, Dick Koester, and James Roamer.

Members of ODK, chosen from male faculty members and students, must have a scholastic average at least equal to the all-men's average. In addition members must have an outstanding record in any two of the following extracurricular activities: debate, athletics, dramatics, music, publications, religion, and societies.

Leonard Grant, who is from New York City, is a senior and expects his BS in Engineering degree in June. Grant was tapped by ODK for the following activities: program director of the Student Council; chairman of the Student Union; and member of the Mecheleciv staff, the dance production group, Phi Sigma Kappa, the University Players, and the Society for the advancement of Management. Upon graduation he hopes to get a position in some engineering aspect of large-scale manufacturing.

Dick Koester was a Colonial backfield star and member of Who's Who last year. He is also a member of Sigma Chi, Gate and Key, Theta Tau, and the American Society of Civil Engineers, More information about Dick can be found in the "Personalities" section of this magazine.

James Roamer, who comes from Ithaca, New York, started out majoring in electrical engineering and joined the AIEE. He became interested in civil engineering, changed his major, and is now a senior, working for his Bachelor of Civil Engineering degree. Upon graduation he plans to go on with his studies, getting a Master's degree in either city planning or traffic engineering. He is a member of Sigma Tau, the Glee Club, Kappa Kappa Psi band fraternity, Pi Kappa Alpha, the ASCE, and president of the University band. In his first year he received the James McBride Steritt award for excellence in Physics.

Congratulations to these three outstanding student engineers, and to the School of Engineering on capturing half of the undergraduate selections to ODK this year.

## ENGINEERS' COUNCIL MEETS

The Engineers' Council met at 8:15 p.m. on November 17, in room 303 of the Student Union Annex with twelve members present.

A report of condition was received from the editors and business manager of the Mecheleciv. The appointment of Professor Norman B. Ames to succeed Professor F. H. Kohloss as faculty advisor to the Mecheleciv was formally approved.

Joseph Irico presented his credentials as a new representative of Sigma Tau, replacing George Gelly, who resigned because of ill health. Irico was elected to fill the post of Council secretary, which also became vacant by the resignation of George Gelly.

The proceedings of the newly organized Council of Vice-Presidents were discussed. Plans were approved for the annual Christmas tree lighting ceremony, to be held this year on Friday, December 16, at 7:30 p.m. Another mixer was discussed, and its date was set as early in February.

The concensus of the Council appeared to be that the Hatchet (the University newspaper) was not affording proper or adequate publicity to the engineers' activities. Ways and means were discussed for remedying this situation.

John Lewis was appointed as Room Chairman for the Council. Anyone who wishes to make suggestions concerning the engineers' room is the Student Union Annex or the engineers' lounge may contact Lewis.

The proceedings of the Student Council meeting were presented by the engineers' representative. It was learned that the new graduation ring for engineers is still awaiting approval by President Marvin. There has been considerable interest evinced in this ring, and it was suggested that concrete evidence of this interest might help speed things up, so that those who expect to graduate in February might have an opportunity to purchase this ring.

The Council approved the purchase of a full page in the Cherry Tree. Half of this page was allotted to the Council, and the other half to the Mecheleciv.

The meeting was adjourned at 9:30 p.m.

## DEAN FEIKER WINS AWARD

Dean Frederick M. Feiker received the coveted achievement award of the Washington Society of Engineers at their banquet held on November 18 at the Mayflower Hotel. This award has been made only three times in the 44 years of the existence of the group, and was given to the Dean for his outstanding work in the field of engineering.

The Dean has just returned from a trip to England, where he consulted with British educators and industrialists on ways and means of introducing training in American mass production methods into British industrial schools.

---

The University is currently featuring an exhibition of paintings by the late Charles H. Walther, the father of our own Assistant Dean of the School of Engineering.

## A.S.C.E. FALL MEETING

Student participation in the ASCE Fall Meeting held in Washington November 1st thru 4th was declared by the national president to be the largest in the records of the American Society of Civil Engineers. Large contingents from George Washington and Catholic Universities, the host chapters to the student group, helped swell the total to some 600 students from engineering colleges all over the East. Ohio State, Syracuse, VMI, VPI and numerous other colleges were represented by large groups at the special field trips arranged for students, and at the banquet and meeting which followed on Tuesday night.

The banquet was held in the Interior Department, and was followed by a meeting of the students attending the conference at the Interior Department auditorium. Students were welcomed at this meeting by the presidents of the two student chapters acting as hosts, and by president Thomas of the parent society. President Thomas urged the students to attend as many of the technical meetings and discussions of the society in the next few days as their classes would permit. Highlight of the meeting was an address given by Admiral Manning, Chief of the Bureau of Yards and Docks of the Navy Department.

On Wednesday, some 260 student guests were conducted on a tour of the Potomac Yards in a special R F & P train, through the cooperation of the R F & P and Southern Railroads. Luncheon at the George Mason Hotel in Alexandria was provided by the Southern Railroad. After lunch the group toured the Southern's shops and testing laboratories and examined a three-unit Diesel locomotive. It was explained that Potomac Yards are actually owned by the R F & P Railroad, but serves five railroads operating in this area. A special Board of Management has been set up, including reprsentatives of each of the railroads served. A manager, reporting to this board, carries out their wishes in managing this yard, which is one of the major yards on the east coast. The tour through the yards was personally conducted by the present manager.

On Wednesday night, a banquet and dance was held at the Statler Hotel, under the auspices of ASCE, for students and junior members. After the proceedings Thursday, a stag smoker was held at Fort Belvoir for all members. The smoker featured boxing matches by Army fighters, and music by the U. S. Navy Band. Sightseeing trips on Friday for the out-of-town visitors completed the meeting, which is the first that has been held in Washington in 21 years.

One of the features of the meeting specially arranged for students was the series of employment conferences. A number of large firms employing engineers, and particularly those firms offering management training for graduates, had sent representatives to the meeting to discuss employment possibilities with interested students. Many of these firms had rented rooms at the Statler hotel to conduct private employment interviews with students who were approaching graduation. In addition, a number of exhibit rooms had been set up, to display engineering work in progress through pictures and miniature models.

### ENGINEERING SCHOOL CALENDAR

December, 1949—January and February, 1950

Dec. 7—Wednesday—Societies Meet, 8:15 P.M.
Dec. 14—Wednesday—Theta Tau Meeting
Dec. 15—Thursday—Engineer's Council Meeting 8:15 P.M., Student Union Annex
Dec. 16—Friday—Christmas Tree Ceremony, 7:30 P.M., Lisner Terrace
Dec. 21—Wednesday—Sigma Tau Meeting
Dec. 25—Sunday—Merry Christmas from the Mechaleciv staff
Jan. 4—Wednesday—Societies Meet, 8:15 P.M.
Jan. 11—Wednesday—Sigma Tau Meeting
Jan. 12—Thursday—Engineer's Council Meeting 8:15 P.M., Student Union Annex
Jan. 18—Wednesday—Theta Tau Meeting
Feb. 16—Thursday—Engineer's Council Meeting 8:15 P.M., Student Union Annex
Feb. 17—Friday—Engineer's Ball, The Washington Hotel
Feb. 25—Saturday—Mechaleciv magazine out

# ALUMNEWS

*Alumni are urged to keep their friends posted on what they are doing by submitting items of interest for use in these columns. Please include your address.*

Congratulations are in order for "*Erv*" *Liljegren*, BS in Eng '49, last year's president of Sigma Tau, and *Dwight Hastings*, BME '48. Both are proud papas of future engineers, boys that is.

---

*Bill Risley*, BME '45, has the most enviable job of the year. He is chief engineer for a farm machinery company in sunny Florida.

---

*Julius Ritter*, one of the most illustrious members and a past president of Theta Tau, is now chief welding engineer at the Boston Navy Yard. Mail will reach him at that address.

---

*Larry Brown*, 1949 president of the Engineers' Council, has been transferred to the Trenton office of RCA. He is finishing his law course at night at Rutgers University. Also at the Trenton office of RCA is *Jim Haskell*, BEE '48.

---

*Fremont Jewell*, BCE '48 and 1948 Student Council President, is working for Alfred Ryan, consulting engineer in Denver, Colorado. He suggests that all CE's catch the next train west as there are plenty of jobs in the Rocky Mountain region. His address is 1235 Grand St., Apt. 316, Denver, Colorado. Another CE who followed Greeley's (Horace, not Professor) classic advice is *Jim Skiles*, BCE '45, who is with the Bureau of Reclamation in Burleigh, Idaho.

---

*Stan Machen*, BCE '44, is in the contracting business in nearby Hyattsville. *Kermit Hunt*, BCE '44, is also in the contracting business in Cheverly, Md.

---

*Ed Burdell*, BME '45, is regional sales manager for a silver company in the Philadelphia area. Ed, who is best remembered as an aviation bug, hopes to combine his engineering and flying with an aircraft machine shop of his own in the midwest. *Ira Jones*, BEE '44, is also in Philadelphia with the Bell Telephone Company.

---

A vino-stained post card has been received from *Jack Lane*, BCE '47, indicating that his travels have now progressed to the Riviera. Jack is making advanced studies on the indeterminate characteristics of French bathing suits. Next stop is Italy and then home for graduate work next semester.

---

*Graham Schofield*, BEE '49, a past staff member of this publication, is employed by the Clark Controller Company in Euclid, Ohio.

---

George Kilpatrick, BCE '45, another past president of Theta Tau, is an airport planning engineer with the Bureau of Ships, Navy Department. George was once barred from any but a rear seat in Professor Cruickshanks' thermo class because Brother Dave Carlson complained that the reflections from George's bald pate blinded the rest of the class. According to George, Professor Cruickshanks took it all very seriously for several weeks.

---

*George Cunney*, also a past president of Theta Tau, is doing very well here in town as a consulting engineer, specializing in water supply and sewage disposal equipment.

---

*Rafe Kahn*, BME '45, formerly with the Naval Ordnance Laboratory, is now with the Bureau of Ships. His specialty is vibration problems. Also at the Bureau of Ships are *J. Harold Link*, *Joe Hartman* and *Duffy Geareau*.

---

Among the new faculty members this fall is *Mickey Miklofsky*, BCE '46, who just received his master's degree from Yale University. After two years with the legendary Professor Hardy Cross he is really putting the senior CE's through their paces. *George Pida*, BEE '46, is also a faculty member. George is credited with having had a hand in the naming of this publication. Also on the staff are *M. R. Moore*, BEE '46, and *Dave Colony*, BCE '48.

---

*Fred Ritchie*, BME '48, advises that we omitted his name from the list of those doing advanced work. Fred is grinding away nights in dear old Stockton Hall. Our most humble apologies, Fred.

---

*Gustave Ring*, president of the Ring Engineering Company and builder of Colonial Village in Arlington, Brentwood Village, and the Marlyn Apartments has recently been elected a director of the American Security and Trust Company.

---

*David J. Price*, MS in Eng 27, received a Superior Service Award from Secretary of Agriculture Charles F. Brennan, before his retirement June 30 from the Bureau of Agriculture and Industrial Chemistry. Dr. Price organized the research work of the U. S. Bureau of Chemistry of Dust Explosions in Industrial Plants, and was Chief of Chemical Engineering Research Division.

## UNDERGRADUATE

Few engineers seem to have time to do more than run a slide rule, write laboratory reports and look enviously at the liberal arts boys passing by on the way to another carefree night on the avenue. It is noteworthy then when a student finds enough hours in the day to be an athlete and an engineer at the same time.

Dick Koester was a three letter man at the local Roosevelt High School, with football as his top sport. Graduating from Roosevelt, he entered Western Maryland University and played football for the one semester he was there before the draft placed him in the Army. Dick is rather noncommittal about the Army except to note that it seemed to take up most of his time for three years, that he was attached to the field artillery, and that he spent some of his time at Hawaii and some later at Okinawa.

Finally discharged in February 1946, he was unable to get into college and therefore bided his time at Columbia Technical Institute over a drafting table, having decided that as a future engineer, lots of drafting experience could do him no harm. In the fall, Dick joined the memorable G Street rat-race that marked the rush of veterans to George Washington.

That fall, before Southern Conference rules were changed, freshman Koester played varsity football while carrying fourteen credit hours of studies. With nothing to occupy his time on such a light schedule except a few labs and football practice every afternoon, Dick joined Sigma Chi fraternity so that his week-ends wouldn't be completely wasted. After the football season closed, Koester returned to his books and restricted his athletic activities to intrafraternity basketball through the winter.

The '47 football season came to an abrupt end for Koester in the fourth game of the year, through a bit of carelessness on someone's part, his leg was broken. Though Dick was crippled as far as the Colonials were concerned, his other activities picked up considerably. In rapid succession he was elected to Theta Tau, the engineering professional fraternity; Gate and Key Society, the fraternity for fraternity men; and the vice-presidency of Sigma Chi.

Last fall Dick decided it was about time to begin worrying about his quality point index, although worrying is one thing that he doesn't do very well, so he decided that 1948 would be his last year of football. The Southern Conference Association helped him reach this decision by ruling that the season at Western Maryland counted as one of the years of his eligibility in college football. In the meantime, the people who chose those listed in Who's Who in American Colleges looked over the list of Koester's achievements and added his name to the roster. This fall Omicron Delta Kappa, the national activities honorary society, was also favorably impressed with Koester's achievements and scholarship and elected Dick to this august society.

As the Mecheleciv goes to press, Dick has just been elected to the vice-presidency of the senior class. His principal platform was a program to get jobs for those of us who are graduating. He is hopeful that he can get representatives from many of the large corporations to visit George Washington, not only to offer jobs but to present a better picture of the opportunities that exist in several fields. For himself, Dick hopes to land a job in the contracting business somewhere in the Washington area.

## ALUMNUS

The story of "Pop" McKnight hardly needs an introduction for those who have attended the University within the last two decades. To these men "Pop" is a familiar figure, almost a tradition.

A successful engineer for fifteen years before entering the University, "Pop" helped many an undergraduate and some of the professors solve some of their engineering problems in his ten-year part time studies for his own two degrees.

This helping hand was not withdrawn when "Pop" received the last of these degrees, a BEE in 1941, (he got his BS in ME in 1938) but has continued right through to the present day. He is Vice President of the Engineering Alumni Association, and takes an active part in the work of both Sigma Tau and Theta Tau.

"Pop" was born Merwyn N. McKnight, October 3, 1886 in Philadelphia, Pennsylvania. For eight years he was a marine designing engineer at the Puget Sound Navy Yard. During the first World War he held the same job at the Todd Drydocks Shipyard in Tacoma, Washington. His next job was with the Navy Department's old Bureau of Engineering here in Washington, D.C. This was consolidated into the Bureau of Ships in 1940. In his twenty three years with the Bureau "Pop" continued in this same line of marine machinery design and layout. During the second World War he was Chief Design Engineer for the mechanical and electrical phases of merchant ship conversions to Naval auxiliaries. He was awarded the Meritorious Civilian Award for exemplary and distinguished service in connection with this project. "Pop" was retired after thirty-one years of service in July of this year, and his current project is keeping Mrs. McKnight, who has been Mrs. for thirty-three years, from modernizing the kitchen beyond recognition.

The McKnights have one son, Merwyn N., Jr. who is also an alumnus of The George Washington University. He is a commercial artist and majored in English.

By way of advice "Pop" says to always check your solutions with the test of good common sense and then go ahead without worrying about the results.

● Armistice day rose bright and clear, and with it came the occasion of another annual Theta Tau social. This social is a gathering for the purpose of discussing engineering problems, such as the calibration of beer bottles and the modulus of elasticity of muscles.

Bob Cashman, our famous gourmet whose culinary experiments had previously been confined to his home laboratory, was given a chance to prove himself in the field. The shrimp and hot dogs (or hot shrimp and dogs) which resulted from his experiments were praised by all hands, and really deserved it.

While things were cooking, the more athletic brothers cavorted on the gridiron. The football classic originally scheduled was to be a struggle between the actives and the alumni, but apparently the alumni had heard of our sensational active team, and they sent emissaries Kenny Brown, Fred Lewis, Vince Toal, Hillis McGee, Mickey Miklofsky and Jimmy Sinsabaugh with news of an emergency alumni meeting in Lower Elsewhere. The messengers didn't get out unscathed, but were shanghaied into the fracas, as the hairier brothers doffed their shirts to become Skins, and play was begun. The Skins received the opening kick-off, and after two pass plays had failed, the third aerial clicked to Shirt defender Dick "All-the-way" Koester, who went all the way to the Skin goal for the first tally. The remainder of the first half was a seesaw battle marked by the tearing of tendons and the partial blinding of "All-the-way" Koester. Time was finally called for the administration of beer hypo's and substitutions.

The second half saw the Shirts gain a 20-6 victory in spite of the efforts of Barney Proctor and rubber-armed Frank Thompson, largely through the catching of Al "Bushel-basket" Craft. Deacon Ames arrived on the scene in time to arbitrate differences of opinion and to keep Jimmy Sinsabaugh out of the trees.

The group convened at the well-laden banquet table, presided over by that gracious host George Titrington, and a reasonable semblance of quiet prevailed for a time as everyone enjoyed Bob Cashman's culinary masterpieces.

Later in the evening, as "Metronome" McGee approached the critical angle, the fraternity choral group, led by "Sleeper" Grayson, gurgled through the strains (or perhaps strained through the gurgles) of many familiar melodies as another successful Theta Tau outing faded into the past.

● The ASME student branch opened its 1949 season by joining the Washington section and the student branches of nearby universities in a stag smoker held on the twenty-seventh of October at the George Mason Hotel in Alexandria. The tariff was only a dollar for students, and the boys really got their money's worth. There were mountains of ham, salami, potato salad, pickles and other delicacies—and pitchers of beer to top things off. The entertainment was something special also, featuring a novelty musician who played three clarinets at the same time while standing on his head, and a hula dancer who got some extemporaneous assistance from our own Nick Sekas. Several recent and not-so-recent graduates were spotted in the crowd, as were professors Kohloss and Cruickshanks. Everyone reports an entertaining and successful evening.

The program committee, under the direction of Bob Curtis, started the ball rolling with a good program for our first regular meeting on Wednesday, November 2. This meeting marked the beginning of a series of programs featuring prominent speakers on subjects of general interest to student mechanical engineers. Mr. Lawrence Goodrich from the United States Patent Office spoke on the subject "Patents from the Viewpoint of the Engineer." Mr. Goodrich included a brief resume of the history of the United States patent system in his enlightening discussion, and described the present operations of the Patent Office and procedures for securing patents. A lively question period at the close of the lecture made it plain that Mr. Goodrich had captured the interest of his listeners.

The meeting also included a presentation of the new officers of the society by president Norman Henry. Bob Cashman has been chosen as vice president, Arthur Schraitle as secretary, and David Tate as treasurer. The meeting ended with the presentation of three door prizes to lucky members.

● Plans for the ASCE football game and picnic, held November 20 in Rock Creek Park, occupied a large part of the business meeting of ASCE November 2nd, in Room 203, Hall of Government. After the brief business meeting an informal talk was given by Moses Freedman, Lecturer in Civil Engineering at the University, and an engineer in the Stanford Construction Company. Mr. Freedman, now Superintendent of Construction on an apartment project on Massachusetts Avenue which will include 800 units, outlined some of the detailed planning involved in keeping a project of this size moving smoothly. He took the students through the full procedure involved from the time an engineer is assigned to the job, until actual construction begins, pointing out some of the major pitfalls a young engineer should avoid.

Leaving the standard pattern of formal lectures, Mr. Freedman concentrated on matter-of-fact problems that do not appear in textbooks, yet keep young engineers awake at night figuring up answers. He continued the outline of procedure through the various stages of construction, explaining the method of planning which permits each wing of the building to proceed in steps, so that no group of workmen will be unable to proceed with their work because of delay by another group.

After their meeting, a number of ASCE students attended the dance at the Statler Hotel, given as a part of the ASCE Fall Meeting, which had begun the preceding day with field trips, a banquet, and meeting. The Fall Meeting lasted through Friday, although few students participated past the smoker Thursday night.

ASCE's Rock Creek Park stag football game, was held November 20, but details were not available at deadline time. The Society is planning to hold it's December meeting in Government 203 again, on Wednesday, December 7, at 8:15 p.m.

● On Wednesday, November 2nd, members of the AIEE and the IRE held their first joint meeting of the semester. Dr. Floyd Firestone, formerly with the University of Michigan and at present associated with the Office of Naval Research, was the speaker for the evening. His subject, "The Ultrasonic Reflectroscope," was presented with the aid of slides pertaining to the theory of the ultrasonic reflectroscope which he has developed. The basic theory of this machine is to project high frequency sound waves through a piece of metal and record on a scope any flaws that occur in the metal. The scope is calibrated in inches and the depth of any flaw in the metal can be detected. Dr. Firestone explained that the instrument cannot detect flaws less than a quarter of an inch from the surface because an indication is made on the scope where the wave enters the metal and another indication less than a quarter of an inch from the entering surface cannot accurately be detected on the screen. He added that the most ideal application of the ultrasonic reflectroscope has been in the detection of flaws in the axles of locomotives. Using different kinds, shapes, and lengths of metal, Mr. E. Mickevicy of the Naval Ordnance Laboratory then demostrated how flaws previously placed in the materials were plainly visible on the scope. At the conclusion of the demonstration, the respective societies held their regular business meetings.

Professor J. S. Antel, AIEE faculty advisor, J. F. McPhail and R. J. Kiernan, chairman and secretary of the AIEE respectively, and R. W. Zens drove to Akron, Ohio to attend the District Number Two AIEE student counselor meeting sponsored by the University of Akron. After a dinner at the university student building, the group listened to a discussion of the River Lake conveyor belt by Mr. J. E. Savely of the AC & Y Railroad and Mr. K. H. Keller of the General Electric Company.

● The most recent meeting of Sigma Tau, the engineering honorary society, was devoted to consideration of new members. Those eligible for membership are men whose scholarship places them in the upper third of the juniors and seniors in the engineering school. Selection from these scholastically qualified persons is further based on the qualities of practicability and sociability. Finally, the approval of at least three members of the engineering faculty is required for each man. After a pledge period, initiation will take place on December 3rd. A banquet at which the initiates will present papers of engineering interest will follow the initiation ceremonies.

From some devious sources a challenge to a football game with Theta Tau has appeared. When brought up for discussion at the meeting, the initial reaction was one of consternation. Such a spirit was undoubtedly inspired by Theta Tau's article in the last issue of the Mecheleciv where it was pointed out that Theta Tau stood eager to field a line averaging over 200 pounds. Some of the more excitable elements were soothed when it was pointed out that some of Theta Tau's football stars hold a dual membership in both organizations. If Sigma Tau can depend upon the passing of Frank Thompson and the broken-field running of Barney Proctor, the fraternity should be able to offer some strong opposition to the Theta Tau team.

**DUPONT** *(Continued from page five)*

water removal. The decision reached was to use four different lines, one from each tunnel, rather than some interconnecting system. This more expensive arrangement was decided upon since it would be possible for one line to become fouled without stopping the service of the whole system. The four lines drain into a 36 inch main, 40 feet underground, running from the east side of the circle directly into Rock Creek.

The possibility of carbon monoxide reaching dangerous concentrations in the vehicular tunnel posed another problem. To clear the air, a mechanical ventilating system, incorporating eight electric fans, each capable of exhausting at least 27,000 cubic feet of air per minute at not less than ¾ inch static pressure, will be used. The fans will not operate continuously, but will be controlled by a carbon monoxide detector system. In the detector system, a sample of air is passed over a chemical known as Hopcalite. The Hopcalite gives off heat when carbon monoxide is present. Thermocouples generate a slight potential which trips a sensitive relay when the temperature reaches a level corresponding to a dangerous concentration of carbon monoxide. When the concentration drops, the relays open and the fans are disconnected.

John McShain, Incorporated, of Philadelphia, the general contractor for the project, started work in the late spring of 1948. Slightly ahead of schedule, his 3.8 million dollar part of the project was brought to a halt when city wide strikes of carpenters and laborers stopped all construction for nine weeks. Still slightly ahead of schedule when the strike ended, engineers expect the project to be in a completed state by February or March of 1950. One transit tunnel, serving the northbound streetcars, is in use at the present time, and the other will be ready for use shortly, although no one is willing to set the exact time service will begin.

McShain, who recently completed the Georgetown University Hospital, has 100 million dollars worth of buildings under contract at the present time. These include the General Accounting Office and the Clinical Health Center. He is also low bidder on the White House renovation project. This contract calls for completion of the work in 660 days, despite the fact that there is not room to use more than 300 workers at a time.

The engineering staff of the project includes Resident Engineer J. J. Hartke, of the District of Columbia Highway Department, with a staff of six men. The McShain company has a layout engineer, with a staff of four men under him, assigned to the project.

Contracts for surface highways adjacent to the circle, at an estimated value of $218,000, and a contract for the vehicular tunnel highway, at an estimated value of $61,500, have not yet been awarded.

## THERMAL SEA POWER

*by B. C. Cruickshanks, Jr.*

In these days of oil shortages and coal strikes engineers and scientists are becoming more and more aware of the need of developing new sources of power. A great many ingenious schemes for obtaining power have appeared in both popular and technical magazines recently, but perhaps one of the most intriguing is one that was proposed over twenty years ago by Prof. Georges Claude and which was actually put into operation on an experimental basis. This was the thermal sea power plant.

The principle of thermal sea power is based upon the fact that the temperature of sea water below a depth of about 3000 feet is practically constant the world over at about 40 to 45°F. In the tropics there is available water with a surface temperature of from 75 to 85°F. Thus there are two unlimited reservoirs of water with a temperature difference of 30 to 40°.

The operation of the plant is really quite simple. Steam was generated, not by the conventional method of applying heat to a boiler, but by drawing the warm surface water into a vacuum chamber where it would vaporize at its present temperature. At 85°F this required a pressure of about 1.3 inches Hg absolute. The steam then passed through a turbine which operated electrical generators. From the turbine the steam went to a cooling tank where it condensed, thus automatically creating the vacuum required for the steam generators. The condenser was cooled by circulating the 40° water which was piped from half a mile below the surface. This involved the pumping of large quantities of water but required only a small amount of power since the only work done was in overcoming pipe friction.

Prof. Claude's first experiments were in Belgium on the Meuse River. Since there was no temperature difference available in the river water, steam from an outside source was mixed with the water so as to raise the temperature to about 35° before it entered the steam generating chamber. With this set-up in which he tried to duplicate as far as possible tropical conditions, Claude was able to generate about 60 kw although that was only a fraction of the power input. However, Claude and his associates were satisfied with the results and decided to go ahead with further experiment under actual sea conditions.

Matanzas Bay, Cuba, was chosen as the site of this installation because the surface water is normally at a temperature of 80°F, while the water at a depth of 2000 feet and approximately one mile from shore is about 39°F. By far the most difficult part of the project was sinking the cold water pipe. In order to obtain a sufficient supply of cold water for condensing purposes a pipe 6 feet in diameter and over a mile long was fabricated. The sections of the pipe were riveted and then welded to insure watertightness and were wrapped in straw and heavy canvas to provide insulation in order that the temperature of the water would not rise appreciably before reaching the condenser. The pipe was assembled on the shore on a specially built track extending more than a mile back from the water. Two unsuccessful attempts were made to float the pipe into position before it was finally accomplished.

The first practical demonstration of the plant in operation was held in October, 1930. For the purposes of the test a line of forty 500 watt electric bulbs had been connected to the generator. It was only a matter of moments after the start of the test before sufficient steam pressure had been produced to revolve the turbine and soon the lamps were all glowing brightly.

The Cuba sea power plant showed very definitely that power could be produced in this manner. However, whether such a plant is economically feasible is another story. In order to produce the 20 kw which was obtained in this test a net input of 80 kw was required. Prof. Claude, however, blamed this entirely on the size of the turbine as compared with the rest of the installation, saying that a turbine ten times larger could have been utilized without increasing the auxiliary power consumption.

One of the limitations of this type of plant is size. At such low pressures as are involved the steam has a tremendous volume, and in order to pass enough steam thru the turbine to generate large quantities of electricity, the boilers, steam pipes, and turbines would have to be so large as to present a serious problem.

While the merits of a thermal sea power plant have yet to be proved, nevertheless Prof. Claude's experiments are significant as a practical demonstration of theoretical thermodynamics.

## RE-REFINED OIL

*By Lloyd N. McCall*

The natural resources of our nation have rightfully received a large share of credit for our present national prestige in the world. However, the terrific drain made mandatory by the successful execution of two World Wars, plus our ever-increasing mechanization of industry, have reduced these resources to a dangerously low level. Since oil is one of our chief concerns at the present time, I should like to discuss one method of reclaiming it for further use.

Across the Potomac from Washington is located

one of the most modern oil re-refining plans in the United States. Having previously met Mr. Worthington, the owner and originator of Worthoil, I visited the plant and obtained not only technical information but also some interesting sidelights on the operation of a small business.

Originally, the path followed by virgin oil used in automotive equipment was essentially this: from the original refinery, it traveled to the dealer, thence to the crankcases of trucks and cars, and, after a thousand miles or so, to the drain can in a service station, to be disposed of as a total loss. Now, after many years of research and development, the used oil is saved for the refining man, who sends his trucks around to pick it up.

The principle of re-refining was made feasible after the Bureau of Standards established the following principle: as long as a molecule of oil holds together the protective film around it, it is as good as it ever was. It only breaks when the heat and pressure become so great that the film can no longer hold the molecule together.

This only happens to a relatively small per cent of the oil in the crankcase, but, when the gasoline from the combustion chamber combines with it, the oil becomes diluted and loses its lubricating value.

The plant, originally built fifteen years ago by Mr. Worthington, burned last year, but he succeeded in securing sufficient backing to rebuild. The new modern plant employs the following procedure: first, the used oil is heated to drive off the moisture and then allowed to settle, after which sulphuric acid is added to precipitate grease, gum, and other foreign matter. Following this, the acid compounds are neutralized, and fuller's earth is mixed in. The mixture then goes through a number of passes in the fractionating tower. The temperature is raised in stages, and gasoline, kerosene, No. 2 fuel oil and the lubricating oils are driven off free of particles as vapors. The residue, a mixture of No. 40 and No. 50, is then forced through heavy filters to remove the clay and other particles. This final step accounts for the primary yield—pure No. 40 or No. 50 oil.

Many laboratory tests have been run on the finished product, and the oil meets the most stringent requirements. When new oil is used in a crankcase, a small quantity of the sludge which has accumulated in the minute pores of the cylinder lining is absorbed, thereby providing better lubrication. In this respect, re-refined oil has been found superior to virgin oil because of its greater ability to dissolve sludges and gums without exceeding its own saturation limit.

Not being satisfied with reports and statistics alone, I proceeded to find a service station that handles Worthoil in order to discover how it holds up in actual use. The manager of a large station handling a nationally known brand of oil was extremely enthusiastic about it and recommended it above any of the regular canned oils which sell for a nickle more a quart.

As in every small business, there is plenty of stiff competition, and in this particular field, it comes from both small and big business. When the plant burned last year, another man started collecting the used oil to be used in the production of cosmetics. This has proven to be a constant source of irritation because it is becoming increasingly difficult to find a reliable source of used oil.

The major competition comes from the large oil companies, who, of course, are using every possible means available to combat the re-use of oil. Their strongest weapon lies in threatening their operators with the loss of their franchise. They merely inform the operator that, if they sell this re-refined oil, their contract will expire at the end of the year. Consequently, a majority of the sales are confined to independent stations, to public transportation companies, and to railroads using diesels.

In 1938, 10,000,000 gallons of oil were reprocessed, and in 1947 40,000,000 gallons were re-refined, with the volume still increasing. Since the oil can be re-refined ten or twelve times without ill effects, re-refining may prove to be a partial solution to the problem of our future oil supply.

ple of exceptions, they were the world's worst public speakers.

Frankly, that doesn't make sense. And I am sure whereof I speak because those few engineers who have taken the trouble to rid themselves of the phobia against public speaking have been outstandingly successful. For example, my predecessor as Chief of the Bureau of Yards and Docks, Admiral Ben Morrell, who is now President of Jones and Laughlin Steel Company, is an extremely effective speaker, and I know this ability played no small part in his success.

What I have said about public speaking applies with even greater force to the need for developing the ability to write persuasive English. I know that during your college days your curriculum called for courses in English, and unless young engineers have changed more than I think they have, you studied English with a minimum of enthusiasm. You probably regarded it as a form of gibberish which liberal art students used to wrangle a degree without doing any work.

It will aid you in persuading not just your fellow engineers, but the people who *hire* engineers and who let contracts for construction and for engineering services. And ultimately, if you are to help the profession obtain the stature and the influence it deserves, you must be able to plead its cause by persuasive writing, directed not to engineers but to the general public.

In brief, you young engineers must learn to make yourselves heard in public affairs, and your best tools are the abilities to speak and to write. The alternative is to accept the status of a hired technician. If this is your attitude, you make a grave mistake. The ability to write effective English is an asset which increases in value as you rise in the profession. It plays a vital part in your ability to persuade others to your point of view.

Thus far, my suggestions have concerned you as engineers in private industry. However, our modern life is so closely integrated that the individual no longer can operate as an independent machine. He also is part of a larger machine, which is his community, and the still larger one which is his country. In fact, we can hope the day is not too distant when national barriers will be lowered to permit a true comity of nations. But until then, our prime concern must be that the United States serve as the most powerful instrument for achieving order and peace.

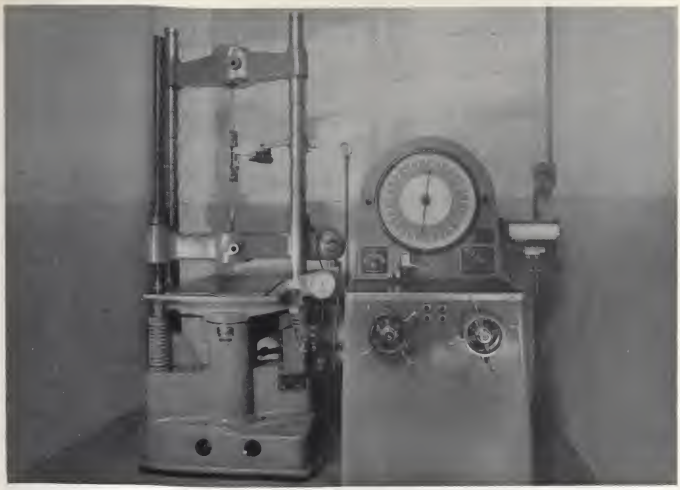
I realize the obligation to accept personal responsibility for the welfare of the nation is getting into the realm of political philosophy rather than engineering. Yet, a few short years ago we say at first hand that this personal obligation is no abstraction—that it is as real as life and death. We saw engineers not only as fighting men, but as troops possessed of vital qualifications for the job of winning the war.

Hostilities ended, but not so the responsibilities of engineers to aid in the building of a peaceful world. Unlike the groundless optimism we indulged in following World War I, we now realize that true peace is an elusive thing, and that only continuing effort will attain it. We can hope for its consummation, but we are determined not to leave our hopes unattended. We are firmly convinced that only by continuing effort, patience, courage, and good will can peace be achieved. We have learned the hard way that Utopia is not for free.

Therefore, you must recognize that you are citizens first and engineers second. You must stand ready to offer to your country your time and your skill —the engineering which enables you to contribute to defense more than most of your fellow citizens.

Now I don't intend to harangue you with a recruiting speech, nor to insist that you join the Navy and see the world. I simply intend to point out as forcibly as I can that this nation's goal of a peaceful and orderly world demands the dynamic support of its citizens, and it is incumbent upon you to fill that role because of your technical training. The country needs your active participation, your ideas, your enthusiasm, and your ability in our military Reserve Organizations. Your passive support is not enough. Our influence for peace is only as strong as the force which lies behind it.

So let this be my advice to you: go beyond the narrow horizons of your technical training to the broader horizons of usefulness and influence in your communities. Recognize that your fellow men can offer you as much as you can offer them . . . and that humility offers a faster road than pride and intolerance. Above all, remember that you are not *just* engineers. You are American citizens with both our obligations and our infinite privileges.



## *Equipped With Peters Accessories!*

This standard 60,000 pound Baldwin-Tate-Emery testing machine is equipped with Type TA-1 Recorder, Model T-1 Extensometer, Templin 5000 pound grips and chain type ram pacer, manufactured by the O. S. Peters Company specifically for this job.

The autographic stress-strain recorder on this machine was designed to plot simultaneous values of load applied by the testing machine and the corresponding deformation of the test specimen. Load recording and strain recording elements are mutually independent. The former is linked with a load indicating element of the testing machine, the latter with a suitable strain follower—designed by O. S. Peters.

The design and manufacture of precision testing machine accessories and custom-built specialized electronic equipment is our business! It demands a high degree of skill in design and construction to exacting manufacturing standards.

**O. S. Peters Co.**
INCORPORATED
**1236 MT. OLIVET ROAD, N.E.**
**WASHINGTON 2, D. C.**

DEVELOPMENT & MANUFACTURE OF PHYSICAL TESTING AND ELECTRONIC EQUIPMENT

R. L. Pearce
1118 Beaville Lane
Silver Spring, Md.

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON 6, D. C.

POSTMASTER: If addressee has removed, notify sender on form 3547 postage for notice guaranteed.

Sec. 562, P.L.&R.
U. S. POSTAGE
**PAID**
Washington, D.C.
Permit No. 593